Available online at www.sciencedirect.com

ScienceDirect

Procedia Social and Behavioral Sciences 9 (2010) 800–804

Procedia Social and Behavioral Sciences

WCLTA 2010

Different learning theories applied to diverse learning subjects

A pilot study

Jenny Pange[a], Aspasia Lekka [c], Eugenia I. Toki [a,b]*

[a]*Laboratory Of New Technologies and Distance Learning, Department of Early Childhood Education, School of Education, University of Ioannina, Ioannina,45110, Greece*

[b]*Department of Speech and Language Therapy, TEI of Epirus, Ioannina, 45500, Greece*

[c]*Department of Mathematics, University of Ioannina, Ioannina, 45500, Greece*

Abstract

Educators work hard to offer new learning opportunities on subjects they teach, especially with the advancement of new technologies. Depending on the target group of learners, the subject and the circumstances, different learning theories may be applied to different teaching subjects.

This study investigates the effects of the different learning theories when applied on various subjects in a computer-based environment. The research question concerns how the different learning theories affect students and their learning outcomes.

The results revealed a difference by implying that not only the learning theory and the teaching practices but also the content, the structure and the nature of the course together with the social interactions play an important role on how people learn and develop their skills.

Keywords: learning theories, learning outcomes

1. Introduction

1.1 Learning Theories

During the last decades researchers have been trying to understand how people learn by using ICTs. It is worth mentioning that learning theories were first discussed by the Greek philosophers, Socrates, Plato, and Aristotle (Hammond et.al., 2001). Researchers while trying to clarify the whole concept and process of learning have reached diverse theories. Learning theories are mostly connected with practice in the sense that theory drives practice. There are various teaching approaches and strategies that emerge from different theoretical perspectives. Some, learning theories are close to practical teaching approaches and others are not.

The main learning theories prevailing educational environments are:

- behaviorism,
- constructivism,

* Eugenia I. Toki. Tel.: +302651050720; fax: +302651005816.
E-mail address: etoki@cc.uoi.gr

1877-0428 © 2010 Published by Elsevier Ltd. Open access under CC BY-NC-ND license.
doi:10.1016/j.sbspro.2010.12.237

- cognitivism , and
- social interaction theories and humanistic theories (DeCarvalho 1991; Roggers 1994; Roseberry-McKibbin & Hedge, 2000; Huitt, 2009).

Behaviorists view generally the learner as passive who only responds to environmental stimuli. According to Watson (1930), "*Behaviourism claims that consciousness is neither a definite nor a usable concept*". The basic stimulus-response relationship drives to an observable change in behaviour (Ormrod, 1999). On the other hand, cognitive psychologists argue that learning cannot be described in terms of a change in behaviour. These theorists make a distinction between learning and memory and learning is viewed as the acquisition of new information. Cognitive learning theories explain that learning occurs from a change in mental activities, and learning occurs whether or not there is an observable change in the learner. Under this perspective an instructor can produce learning by transferring information to the learners who are '*information processors*' and in turn knowledge is organized, coded and recalled later when necessary (Barrett and Erin, 2003). Constructivism considers learning as an active process where the learners build on their own representations by giving points to their prior knowledge (Pange, 2000). Humanism considers learning as an independent action related to the values an individual develops through the lifespan (Rogers & Freiberg,, 1994; Huitt, 2009). Finally, social learning theory focuses on the learning that occurs within a social context. It considers that people learn from one another, including such concepts as observational learning, imitation, and modelling (Ormrod, 1999).

Cooperative Learning is widely used in classroom contexts. Either in synchronous or asynchronous way often students form small groups which are either self selected or set up by their teacher. What is cooperative learning? According to the information given by online publications: "*Cooperative learning is a successful teaching strategy in which small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject. Each member of a team is responsible not only for learning what is taught but also for helping teammates learn, thus creating an atmosphere of achievement*" (Cooperative Learning, 1992). Through the implementation of this learning theory, students are proven to have "*improved academic achievement, improved behavior and attendance, increased self-confidence and motivation, and increased liking of school and classmates. Cooperative learning is also relatively easy to implement and is inexpensive …"* (Cooperative Learning, 1992). Dillenbourg and Schneider (1995) have proposed some ideas on the wide use of collaborative learning. They argued that "*from a 'learning as knowledge transmission' perspective, if two agents A and B both ignore some piece of knowledge, there is no reason why they could acquire this knowledge by simply collaborating*".

1.2 New Technologies and emerging Learning Theories

The implication of New Technologies and the advancement of system studies have also revealed other learning theories which are either new or a mixture or an outcome of the well known learning theories. According to Rieber, 1994 and Simpson, 1995 the Dual Coding Theory (Dual Coding Theory, 2001)*"...proposes that memory consists of two separate but interrelated codes for processing information—one verbal and the other visual. The verbal and visual systems can be activated independently, but there are interconnections between the two systems that allow dual coding of information. The interconnectedness of the two systems permits cueing from one system to the other, which in turn facilitates the interpretation of our environment…".*

Electronic and distance education which nowadays is offered either by Universities or other Educational bodies has found more attractive learning systems. The rapid growth of distance education and its popularity has changed the ways of passive learning. Kearsley and Shneiderman (1999) have developed the Engagement Theory. *"...The fundamental idea underlying engagement theory is that students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks. While in principle, such engagement could occur without the use of technology, we believe that technology can facilitate engagement in ways which are difficult to achieve otherwise. So engagement theory is intended to be a conceptual framework for technology-based learning and teaching. Engagement theory is based upon the idea of creating successful collaborative teams that work on ambitious projects that are meaningful to someone outside the classroom. These three components, summarized by Relate-Create-Donate, imply that learning activities:*

- *occur in a group context (i.e., collaborative teams)*
- *are project-based*
- *have an outside (authentic) focus…"*

According to Laird (1985) "*There are four inputs necessary in every system to produce a product or service:*

- *People: The workers making up a group and linked by a common activity.*
- *Material: The raw products which go into the system.*
- *Technology: The technique for achieving a practical purpose or goal.*
- *Time: The measured period during which an action or process begins and ends…"*

Moreover, Laird (1985) also states that "*…although a new behaviour might be learned in a variety of methods, it can always be traced back to three major activities:*
Cognitive (Knowledge) - mental skills where the brain must be used to perform intellectual tasks.
Affective (Attitude) - best described as "coming from the heart," - just because we know something, does not mean will act upon it.
Psychomotor (Skills) - physical skills where the body must coordinate muscular activities (some are minor, such as turning a dial with your fingers)".

Technology in educational settings provides situational and visual cues allowing users to reflect, get involved, interact, communicate, produce and learn. Haugland (2000) supports the implementation of technology in classrooms in order to accomplish learning objectives that provide opportunities for experimentation, investigation and discovery either individually or in groups.

So, as learning is part of our everyday life we expect the progress of research to lead to many discussions and debates. Nowadays how important is it to reconsider the existing learning theories or to propose any new learning theories? On the other hand, learning outcomes have to be under evaluation in order to have an efficient teaching method. How people from all age spectrums and all different backgrounds will adapt a learning method in formal and non-formal settings? Does people's learning process change through the years as they have to deal with huge amount of information? What is the impact of globalization? The purpose of this pilot study is to investigate how people learn with or without ICT use in formal and non-formal settings.

2. Materials and Methods

A pilot study was conducted in the Laboratory on NT and Distance Learning in the University of Ioannina Greece, in 2009. In this pilot study the sample (N=67) was grouped in age spans based on the stages of cognitive development as proposed by Piaget (1929). The only difference in age-grouping was the consideration of adults older than 18 years-old as a different group. So, there were 5 groups as follows:

- 5 children, aged 3-4 years,
- 20 chidden, aged 5-7 years,
- 10 children, aged 8-11 years,
- 12 students, aged 12-18 years and
- 20 adults, aged 18-50 years.

The sample was random and participants volunteered to take part in the current study. Part of the study was computer based and the analysis follows. All participants aged less than 18 years took part in an a qualitative study with observation carried out by the researchers and those aged more than 18 years were asked to fill in a set of questions related to their learning attitudes towards different courses for a period of six months.

Children aged 3-4 had an interaction with the computer in a language task. This task lasted 15 minutes and aimed at vocabulary enrichment through 12 sessions. The second group participated in a probabilistic task which was conducted on the computer and lasted 10 min. Participants were asked to predict and justify about how likely an outcome would be. The third age group participated in an online geographical game. The interaction lasted 20 min and children were separated in couples. There were points and the winner would gain a small prize. The 4th group had to create a blog with a content related to environmental issues. They had a time limit of two months and worked in groups of 3. The last group completed an online questionnaire published on a website and answers were recorded automatically.

The data was collected and analyzed.

3. Results and discussion

In this pilot study, the first two age groups had both qualitative research (observations from the researchers on the way children learn) and also quantitative research (questionnaire on computer based games). For children aged 3-7 years the learning style imposed by the preschool teacher played the most important role. According to the school curricula most subjects were taught in a constructivist way whether others used the social play in order to establish common activities. All children aged 3-4 enjoyed the language task in the computer. Toddlers imitated the stimuli on the screen affectively and through their bodies and senses reproduced the new words in the context of a sentence. The role of the adult who was close to them was very important and the function of the computer was very encouraging. So, technology affected the way preschool subjects were taught to children. Moreover, as children were quite familiar with technology (like mobile phones, etc) they easily used it in order to learn via common games. It is worth saying that 50 years ago, when technology was not present at schools, social learning theories had a different impact on the learning environment of young children.

The participants of the second group tended to learn also through personal constructs and experiences. At this age, preschoolers learnt both from formal (school) and informal (family, friends) settings and before developing advanced cognitive skills. Analysing their answers from the computer game on probabilistic tasks, their functions were based mainly on intuitions. These results agreed with the findings of Fischbein (1975). Children in this age group began also to detect their errors and at a certain level would start to interact and behave within social limits. Collaboration with other children on a computer project began to evolve. So, in this age group children started the conformation of abilities that derived from constructivism and social theories.

In the third age group, more complex cognitive capacities started to appear depending on the subject they learnt. In the computer based game, on the subject of Geography the learning style was more complicated. Children worked with different mechanisms such as memory, attention and problem solving. Couples behaved competitively and social skills of communication emerged in all participating children in this study.

The fourth group illustrated mostly social learning attitudes. Behaviourism, constructivism and cognitivism were also apparent and correlated to the subject they had to learn. Time - as a sequence of events - played an important role to the subjects which children had to attend in schools. Economical problems for example, of the whole country and other EEC countries, overstated the interest of children to learn more and more about economics, using mainly social theories (collaborative learning). They formed groups of 2-3 students and they were discussing the whole mater using on paper and electronic material.

The participants of the last group, who were adults, expressed their opinions on various subject areas based on certain criteria:

- The way the teacher was presenting the module to the students (92%),
- The number of different activities involved (89%)
- The different technological devices used (88%)
- The later use of the knowledge of the module (85%)
- The time needed to learn the module (85%)
- The history of events which coincide during the teaching of the module (84%)

According to the results of this pilot study children and students aged 8 to 18 years learnt using different learning theories in different subject areas. The presence of NT was very crucial in all ages. ICTs enhanced learning and our findings coincide with the findings of other studies (Clements & Nastasi, 1993; Kamil et al, 2000; Kennewell, S. and Beauchamp, G., 2007). So, depending on the subject area (i.e. language, mathematics, geography, technology, environment, social sciences, and statistics) students combined learning styles or switched from one to another learning style.

It is worth mentioning here, that through this pilot study a new parameter was raised, “time”. Either as a sequence of events in a time domain or as a consequence of the participants’ maturation, time seems to play the most important role in learning outcomes.

The sample of the current pilot study is limited and future implications would be appropriate in order to move to final conclusions. However, according to the current findings learning is a multidimensional process where the taught content, the individual as personality and the dimension of time are proposed to be the three main axes in all learning environments.

4. Conclusion

In conclusion, as individuals grow up they use more and more learning theories which are more complicated and are mainly correlated to the subject, area taught, the personality of the learner and the time/place of the events. As this study is only a pilot one, a broader research is in progress, in order to reach some kind of mathematical representation of learning.

Even though cognitivism, behaviourism, constructivism, social interaction theories and humanistic theories are the main learning theories, new approaches arise on how people learn. New Technologies are dominating the learning era and their role in formal and informal learning stress new dimensions on pedagogical, theoretical and practical grounds.

References

Barrett, C., & Erin, C. (2003). Cognitive learning theory - Web Quest. Retrieved 20th May, 2009 from http://suedstudent.syr.edu/~ebarrett/ide621/cognitive.htm.

Clark, D. R. (2004), Instructional System Design Concept Map. Retrieved January 25, 2010 from http://nwlink.com/~donclark/hrd/ahold/isd.html

Clements, D., Nastasi, B., (1993). Electronic media and early childhood education. *Handbook of research on the education of young children*. New York: MacMillan.

Cooperative Learning. (1992). Retrieved 25th May, 2010 from http://www2.ed.gov/pubs/OR/ConsumerGuides/cooplear.html

DeCarvalho, R. (1991). The humanistic paradigm in education. *The Humanistic Psychologist*, 19(1), 88-104.

Dillenbourg, P. and Schneider, D. (1995) Collaborative learning and the Internet. [online] Retrieved 30th Aug, 2010 from http://tecfa.unige.ch/tecfa/research/CMC/colla/iccai95_5.html#HEADING9

Dual Coding Theory. (2001). Retrieved 15th Sep, 2010 from http://www.hi.is/~joner/eaps/wh_dualc.*htm*

Fischbein, E. (1975). *The intuitive sources of probabilistic thinking in children*. Dordrecht, The Netherlands: Reidel

Hammond L.D., Austin, K., Orcutt, S. and Rosso J. (2001). *How people learn: Introduction to learning theories*. [online] Retrieved 20th Jul, 2009, from http://www.stanford.edu/class/ed269/hplintrochapter.pdf

Haugland, S. (2000). Computers and young children. *Eric Digest*, ED438926, 1-2.

Huitt, W. (2009). Humanism and open education. *Educational Psychology Interactive*. Valdosta, GA: Valdosta State University. Retrieved 1st Sept, 2010 from http://www.edpsycinteractive.org/topics/affsys/humed.html

Kamil, M. L., Intrator, S., & Kim, H. S. (2000). Effects of other technologies on literacy and literacy learning. In M. Kamil, P. Mosenthal, P. D. Pearson, & R Barr, (Eds.), *Handbook of Reading Research*, Vol. 3 (pp. 773–788). Mahwah, New Jersey: Erlbaum.

Kearsley, G, and Shneiderman, B. 1999, Engagement Theory: A Framework for Technology-based Teaching and Learning, 1-6. [online] Retrieved 24th Aug, 2010 from http://home.sprynet.com/~gkearsley/engage.htm

Kennewell, S. and Beauchamp, G. (2007). Learning, Media and Technology, 1743-9892, Volume 32, Issue 3, , Pages 227 – 241

Laird, Dugan (1985). *Approaches To Training And Development*. Reading, MA: Addison-Wesley.

Nikiforidou, Z. and Pange, J. (2010). "Shoes and Squares": A Computer-Based Probabilistic Game for Preschoolers*, Procedia - Social and Behavioral Sciences* 2(2), pp. 3150–3154.

Ormrod, J. E. (1999). *Human learning*. New Jersey: Prentice Hall.

Pange, J. and Makris, P. (2000). *Informatics for Preschool Teachers* [in Greek]. Eds of University of Ioannina, Greece.

Piaget, J. (1975). The child's conception of the world. Totowa, NJ: Littlefield, Adams. (Originally published 1932).

Rogers, C., & Freiberg, H. J. (1994). Freedom to learn (3rd Ed.). New York: Macmillan

Shipley, K. G., & McAfee, J. G. (1998*). Assessment in speech-language pathology: A resource manual* (2nd ed.). San Diego, CA: Singular Publishing Group

Vockell, E. and Schwartz E. (n.d.) How Do Computers Enhance Learning? Important Instructional Principles [online]. Retrieved 20th Aug, 2010 from http://education.calumet.purdue.edu/vockell/cai/

Watson, J. (1930/1970) *Behaviorism* New York: W.W. Norton & Inc.